MARYLAND STATE HIGHWAY ADMINISTRATION

Seismic Refraction Survey Fact Sheet

1. **What is seismic refraction?**

Seismic refraction is performed using a seismograph and/or a series of geophones and an energy source, usually a seismic impinger. (Please see pictures on Page 2.) Seismic waves have differing velocities in different types of soil or rock. In addition, the waves are refracted when they cross the boundary between different types or conditions of soil or rock. The seismic refraction method is used to identify the characterization of the subsurface geologic condition and geologic structure.

2. **How do you perform the seismic refraction survey?**

The seismic refraction survey is performed by placing a cable along the area to be tested. Geophones are placed at intervals along the cable. The geophones are inserted into the ground by hand. The cable is connected to a seismograph, usually in a hand-carried box, for data collection. The seismic impinger, which is a handheld hammer-like device, is struck on the ground and creating a vibration that is measured by the seismograph. The impinger is struck at various locations along the line and the data is recorded.

3. **What impact does the seismic refraction survey have to the surrounding natural resources?**

In order to set up the seismic lines, the surveyors will climb up the hill and wade through the stream to place the geophones. The insertion of the geophones makes a small hole in the soil about 1/2" wide by 4" deep. No trees will need to be cut down and impact to the vegetation will be minimal. Once completed, all equipment will be removed.

4. **Will the lane closure be applied during the survey?**

Since there is no work directly on the roadway, we do not anticipate a lane closure during the survey.

5. **When will the survey start?**

Per the pre-coordination with DNR Park service, we anticipate the survey starting in mid-September.

6. **How long will the survey take?**

Depending on the length of the survey line, obstacles encountered and the terrain, each line can take from a couple hours or more to complete. We anticipate completing the survey within 2 weeks for both Section A and Section G.

7. **Will borings still be needed after seismic refraction survey?**

The seismic refraction survey will help to identify the general subsurface conditions; however, the result could be ambiguous in certain areas where the subsurface has a complex combination of strata. In those areas, SHA may perform drilling to clarify the soil or rock condition. The combination of the seismic survey and borings will provide more accurate subsurface condition and help to develop a constructability alternative. Soil borings will only be pursued if the seismic refraction fails to provide satisfactory results.

Pictures of the seismic refraction survey devices

Geophones

Impingers−Hammer type & Slide type